

Preface



As technological and scientific advances proliferate, the practical application of these advances becomes more complex and challenging. Without coordination, innovations in the research and academic environments may be poorly suited for solving real-world problems or simply irrelevant to them. In order to take advantage of the rapidly growing corpus of scientific and technical innovation, leading-edge developers must collaborate with experts in the rapidly changing business world. Business knowledge must be used to inform the design of systems, services, and solutions or to adapt innovations for settings that may have been unanticipated by their original designers. Feedback from this adaptation then gives rise to further innovation.

The synergy between business management and analysis and technological innovation is not only desirable but often mandatory for companies to stay competitive, given today's challenging business climate. Expertise from research and academia can guide the process of business transformation, while business acumen and experience can be instrumental in improving software engineering methods and the applications themselves.

Innovations in information technology (IT) are particularly critical in pushing the frontiers of product research and development, especially in research-intensive fields such as the pharmaceutical industry. The rigorous definition of business processes can lead to greater business interoperability (critical for the on demand environment) and facilitate the use of mathematical models to make these processes more efficient.

This issue of the *IBM Systems Journal* contains nine papers on the innovative application of technologies in business settings, resulting in the improvement of business process integration, supply chain management, and other business priorities. The issue also contains a paper on interactions among Java agents. We wish to thank Carl Abrams for his work in developing and coordinating this issue.

New paradigms and approaches can be crucial in enabling the application of innovative technologies. In "A technical framework for sense-and-respond business management," Kapoor et al. describe two pilot projects that used analytical models applied to business processes. They describe a technical framework supporting the "sense and respond" approach, which enables businesses to respond to a rapidly changing business environment. In contrast, Hess, in "Aligning technology and business: Applying patterns for legacy transformation," addresses the challenges posed by legacy applications that resist rapid change. He presents an approach using patterns to map business requirements to the requirements of application software, yielding potential solutions for the migration to new methodologies.

Koehler et al., in "Declarative techniques for model-driven business process integration," present an approach which uses model-based generation of programs in BPEL4WS (Business Process Execution Language for Web Services) in order to facilitate business process integration and automation.

In "Empowering the business analyst for on demand computing," Arsanjani describes the use of GOOD

(grammar-oriented object design) to find commonalities in business processes and create software architectures that evolve in tandem with business architectures. He illustrates this method with an example involving the patent offices of the United States, Japan, and Europe. In their paper “Toward an on demand service-oriented architecture,” Crawford et al. extend the scope of service-oriented architecture (SOA) to include business process transformation, policy-based IT management, and SOA-enabling technologies.

Grey et al., in “The role of e-marketplaces in relationship-based supply chains: A survey,” present the results of a survey which reflects the challenges businesses face as they make the transition from traditional relationship-based contracting to the business-to-business (B2B) electronic marketplace. The authors describe potential sources of value of e-marketplaces, emphasizing dynamically priced B2B transactions. Martin et al. describe a learning management system for research and development as well as clinical groups. Innovative use of change management enables this system to manage its consistency, relevance, and currency by using subject matter experts and global communication and coordination.

The pharmaceutical industry has been the beneficiary of many innovative IT systems. In their paper “A model-driven approach to industrializing discovery processes in pharmaceutical research,” Bhattacharya et al. describe a model-based approach to the process of discovering new chemical entities that could be turned into new effective drugs. This approach models several layers of business processes and creates a mapping between the layers. Cortada and Fraser, in “Mapping the future in science-intensive industries: Lessons from the pharmaceutical industry,” show how the next decade of advancement in this industry can be mapped as it makes the transition from chemically based medications to specifically targeted treatments based on biology.

The final paper in the issue, “Injecting roles in Java agents through runtime bytecode manipulation,” by Cabri et al., describes an infrastructure for interactions among Java agents. The infrastructure facilitates the streamlining of agent code and enables agents to dynamically assume functionality at runtime.

The next issue of the *Journal* is devoted to open source software.

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